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# Effects of Correlations Between Particle Longitudinal Positions and Vertical Plane on Bunch Length Measurements in the GBS Electron LINAC at ELI-NP

The effects of the assumptions about the bunch proprieties on the accuracy of the measurement method of the bunch length based on a Radio Frequency Deflector (RFD) in electron LINear ACcelerators (LINACs) are investigated. In particular, when the electron bunch at the RFD has correlations between particle longitudinal positions and vertical, the measurement is affected by a deterministic intrinsic error. A case study about this effect in the electron LINAC of the Gamma Beam Source (GBS) at the Extreme Light Infrastructure–Nuclear Physics (ELI-NP) is reported. Relative error is estimated by using ELEctron Generation ANd Tracking (ELEGANT) code to define reference measurements of bunch length.

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